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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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07/31/2001

John D. Brown

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09/09/2004

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EXAMINER

NAKHJAVAN, SHERVIN K

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/919,378

Applicant(s)

BROWN ET AL.

Examiner

Shervin Nakhjavan

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-15 is/are allowed.
- 6) ☒ Claim(s) 16-32 and 35-44 is/are rejected.
- 7) ☒ Claim(s) 33 and 34 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: figure 8l is missing as part of the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 24-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 24-29, the phrase "the calibrated target moving step" seems to be referring to a previously cited Moving step which does not appear in the claims.

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Therefore, these citations are vague and confusing because it is unclear what feature or element is further limited by this language.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 30-32, 35, 36-39, 40, 43 and 44 rejected under 35 U.S.C. 102(b) as being anticipated by Heilbrun et al. (US 5,603,318).

Heilbrun teaches limitation of claim 30, a system for characterizing a geometric element of an object comprising: a movable calibrated target comprising at least two differentially detectable features having a known geometric relationship to each other (Column 5, Lines 42-51, where the fiducial 220 is the calibrated target which is movable and according to column 8, line 64 through column 9, line 3, the coordinate and position of the points of the fiducial structure of figure 3A should be known with respect to planes and each other); and a photogrammetric analysis system (Column 5, Lines 42-57, where cited operation is the photogrammetric process) for: determining a relationship of the calibrated target to a calibration geometric element (Column 9, Line 65 through Column 10, Line 4, where the workspace is defined including the fiducial structure, being the calibrated target, and the head, being the geometric element, with their coordinates and relation to each other is known inherently and further discussed at

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Column 10, lines 55-60, where the body region coordinates within a workspace is defined); and spatially characterizing a geometric feature of an object desired to be characterized using the calibrated target features (Column 7, Lines 9-25, where geometric features of an object being the medical instrument and it is characterized by its coordinates detection within a calibrated workspace utilizing the fiducial structure or the calibrated target);

Heilbrun teaches limitation of claim 31, system further comprising detectable features applicable to the calibration geometric element for facilitating the determination of the relationship of the calibrated target to the calibration geometric element (Column 13, Lines 41-47, where edge detection is an alternative detectable feature of the object);

Heilbrun teaches limitation of claim 32, the photogrammetric analysis system comprises at least one camera for taking at least two photographs of a portion of the object, each photograph containing the calibrated target features and at least a portion of the desired geometric feature, each photograph taken from a different perspective relative to the object (Column 7, Lines 9-25, where the cameras take photograph and the photograph images include fiducial markers (calibrated target), and the medical instrument device as the object);

Heilbrun teaches limitation of claim 35, the calibrated target fetures comprise imageable shapes (Column 9, Lines 45-54);

Heilbrun teaches limitation of claim 36, the calibrated target features comprise a unitary first feature having a first shape and plurality of a second features having a second shape different from the first shape (Column 9, Lines 32-40, where different

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features of target is discussed as fiducial points being of different shapes for forward points or first features and rearward points or second points);

Heilbrun teaches limitation of claim 37, the first feature is positioned substantially centrally on the calibrated target (Figure 3A, Items 361 and 368 are substantially central);

Heilbrun teaches limitation of claim 38, a first one of the second features is positioned at a first distance from the first feature and a second one of the second features is positioned at a second distance from the first feature unequal to the first distance (Figure 3A wherein according to column 9, lines 32-40, the forward points would be of different shape and first features 364 and 367 and rearward shapes of points 361 and 368 are second features, and wherein the first one of the second features is distanced unequally from each of the first feature points on the target);

Heilbrun teaches limitation of claim 39, the calibration geometric element has substantially planar face and the calibrated target features are substantially coplanar (Figure 2, item 210 is planar and features of item 220 are coplanar);

Heilbrun teaches limitation of claim 40, the calibrated target further comprises means for affixing the calibrated target to a portion of the object (Column 7, Lines 60-62);

Heilbrun teaches limitation of claim 43, the calibrated target comprises a substantially planar target element and a planar base affixed to the target element at a predetermined angle (Column 9, Lines 22-26, where the elements of the target are affixed perpendicularly to the plane in right angle);

Heilbrun teach limitation of claim 44, the calibrated target has a first planar face containing the target features and a second planar face joined to the first planar face at a known angle (Column 9, Lines 17-21).

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 16-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Corby, Jr. et al. (US 5,805,289).

Regarding claim 16, Corby teaches, a method for characterizing a geometric element of an object comprising the steps of: positioning a calibrated target adjacent a geometric feature of an object desired to be characterized (Column 4, Lines 16-26, where the calibrated target is any one of the SRDs and the object would be the structure 13, the geometric feature would be the islands of the structure or the coordinate locations of the islands of the structure, finally the SRDs or targets are fixed onto the surface of the structure as being adjacent to it as shown in figure 1 with respect to SRDs 51, 52, 53 and islands i.e surrounding the bearing 62), the calibrated target comprising at least two differentially detectable features having a known geometric relationship to each other (Column 4, Line 63 through Column 5, Line 5, where the button targets 71 are fixed at a predetermined relation to each other), the features further having a known geometric relationship to a surface of the object (Column 5,

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Lines 5-8, where the buttons of the target are geometrically related to the surface of the structure); and applying photogrammetry to the calibrated target features and the desired geometric features to spatially characterize the desired geometric feature (Column 4, Lines 35-62, where by capturing image sets, any point of the structure can be measured and be expressed in a absolute global 3D coordinate including the islands location and coordinates and also calculate dimensions of features);

Corby teaches the limitation of claim 17, the photogrammetry-applying step comprises the steps of: taking at least two photographs of a portion of the object, each photograph containing the calibrated target features and at least a portion of the desired geometric feature, each photograph taken from a different perspective relative to the object; calculating relative positions of the calibrated target features and the desired geometric features; and performing a geometric calculation on the relative positions to determine spatial coordinates of the geometric element (Column 4, Lines 35-54, where two or more images are acquired by the digital camera where each of the images include an SRD and an island area or a desired object feature and CMM does the coordinate generation of the features of the SRDs and based on item any point including the object features can be measured and be expressed in the same 3D coordinates, in addition column 4, Lines 25-26 teaches the camera taking plurality of the images 55, 58 of an island overlapping taken from different directions and calculating the location and orientation of the camera coordinate at each photograph take);

Corby teaches the limitation of claim 18, the photograph-taking step comprises taking digital photographs, and wherein the calculating and performing steps are

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performed in a computer having photogrammetric analysis software (Column 3, Lines 5-8);

Corby teaches limitation of claim 19, the calibrated target features comprise imagable shapes (Column 4, Line 63 through Column 5, Line 3, where plurality of individual shapes i.e. buttons L-shaped bar components are imaged);

Corby teaches limitation of claim 20, the calibrated target features comprise a unitary first feature having a first shape and a plurality second features having a second shape different from the first shape (Figure 4, items 71 and 73, where shapes 71 are different than shapes 73);

Corby teaches limitation of claim 21, the first feature is positioned substantially centrally on the calibrated target (Figure 4, Items 71 are widthwise centrally located on each bar);

Corby teaches limitation of claim 22, a first one of the second features is positioned at a first distance from the first feature and a second one of the second feature is positioned at a second distance from the feature unequal to the first distance (Figure 4, each one of Items 73 which is part of the second feature is distanced from each of the items 71 which is part of the first features, differently or unequally);

Corby teaches limitation of claim 23, the calibrated target features are substantially coplanar (Figure 4, Items 71 and 73 are placed in the same plane of L-shaped object).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heilbrun et al..

While Heilbrun fails to specifically teach affixing of the target to the object using a magnet or a adhesive as variously claimed, Heilbrun clearly teaches attaching of the tracking targets to the object such as two fiducials (Column 7, Lines 60-62). Absent some showing of criticality or unexpected results, the exact affixing procedure is believed to be within the skill level of the ordinary practitioner in this art, who would find it obvious to choose the most appropriate number of images for a given application.

Allowable Subject Matter

10. Claims 33 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record specifically Heilbrun does not teach calculating the relative positions of the calibrated target features and the desired geometric feature for performing geometric calculation on the

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relative positions to determine spatial coordinates of the geometric element of claim 33 combined with other features and elements of the claim.

11. Claims 24-29 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record specifically Corby, Jr. et al. does not teach moving the calibrated target to different positions with respect to the object of the claims combined with other features and elements.

12. The following is an examiner's statement of reasons for allowance: claims 1-15 are allowed because, the prior art of record specifically Corby does not teach moving the calibrated target adjacent a geometric feature of an object desired to be characterized of claim 1 combined with other features and elements of the claim.

Other prior art cited

13. Prior art of record cited and not relied upon is considered pertinent to applicant's disclosure.

The US patent Application 2004/0150816 and US Patent 6,460,004 variously teach coordinate calibration related to applicant's invention as claimed.

Contact information

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shervin Nakhjavan whose telephone number is (703) 306-5916. The examiner can normally be reached on Monday through Friday from 8:00 am to 5:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau, can be reached at (703) 305-4706.

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Any response to this action should be mailed to:

Assistant Commissioner for Patents
Washington, DC 20231

Or faxed to:

(703) 872-9306 for *formal* communications, please mark "**EXPEDITED PROCEDURE**"

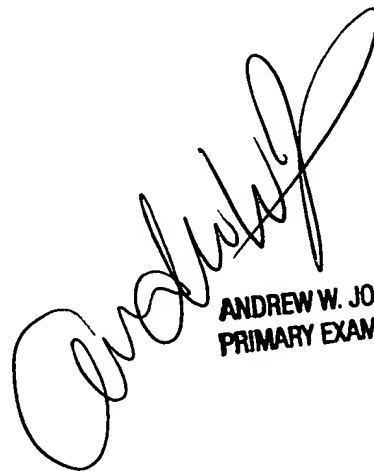
or:

for *informal* or *draft* communications; please label "**PROPOSED**" or "**DRAFT**".

Hand delivered responses should be brought to Crystal Park 2, 2121 Crystal drive, Arlington, VA, sixth floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Tech center 2700 customer service office (703) 306-0377.

Shervin Nakhjavan 3.N
Patent Examiner
Group Art Unit 2621
September 5, 2004.



ANDREW W. JOHNS
PRIMARY EXAMINER